Net Neutrality Regulation: Finding What Matters to Investors.*

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Abstract

We examine investors' reaction to six news events relating to net neutrality regulation. The firms in our sample include Internet Service Providers(ISPs),traditional media companies, and new media. We find only one of the six news events is significant for all three groupings of firms, the election of Trump as President. The letter by President Obama in favor of returning to Title II regulation is significant for one of the three groupings of firms, ISPs. The returns for ISPs have a significant negative response to the news release that President Obama supported increased regulation, and a positive response to the election of Donald Trump. Media companies (both traditional and new) are found to have a significant negative response to the election of Donald Trump. The loosening or abandonment of net neutrality principles associated with policy positions that have the current administration's support, suggests that investors in media companies see the change in regulatory direction as a negative, while investors in ISPs see the changes as positive.

1 Introduction

Net Neutrality, broadly speaking, is associated with a set of principles that supports open access to the Internet. While open access sounds pure and simple, there has been considerable debate about this policy. Different groups, such as consumers, firms, and investors are affected by this broad and sweeping regulatory regime in different ways. Proponents of Net Neutrality contend that rules are needed in order to prevent Internet Service Providers (ISPs) from using their power in the broadband access market to enhance their market power in the content market. Opponents of Net Neutrality contend that the ISPS do not have market power in the provision of broadband access. Furthermore, they believe that ISPs do not have an incentive to exclude competitive content providers, because exclusion would reduce household demand for broadband connectivity. Rather than go back over all the arguments for and against net neutrality, to determine whether the gains for one group(s) offset costs imposed on others, our goal is more modest.[1] We focus on investors' reaction to four well-defined events on the road towards net neutrality, and two that would relax some of the principles of net neutrality or abandon it completely.

Not all firms are affected in the same way by these events. Therefore, following Crandall(2017), we separate firms into three groups: ISPs; traditional media companies, such as Disney; and new digital media companies, such as Google. Unlike Crandall, we do not assign a political motivation to the introduction of net neutrality principles. Rather, we consider how investors perceived six well defined events. Our goal is to

[1] A summary of the debate can be found at Federal Communications Commission, *In the Matter of Protecting and Promoting the Open Internet*, Report and Order on Remand, Declaratory Ruling, and Order, 30 FCC Rcd 5601 (Title II Order).

examine what a net neutrality regulatory framework means to stock market investors and to the investments made by publicly traded firms. We will look at two court rulings on FCC decisions, as well as the Obama administration's public support for increased regulation of the ISPs, and an FCC staff investigation of mobile ISP's pricing of content delivery. We will also study two events associated with the election of President Trump. A simple market model is used to assess whether these events are significant.

Our main finding is that the election of Donald Trump as President is a statistically significant event with a positve impact on the returns of ISPs and a negative impact on the returns of old and new media companies beyond what is captured from simple market beta exposure. Obama's November 2014 letter in support of Title II regulation is also significant for the ISP group. There are no other events that had a statistically impact beyond what would be captured by simple market beta exposure. Our empirical approach assumes that investors in the major firms deeply involved with net neutrality regulation assess regulatory changes based on the "convential" rational asset pricing model. We employ the Capital Asset Pricing Model (CAPM) in our analysis, and dummy variables are added to the market model to represent events of interest.

The paper is organized as follows: Section two discusses the regulation of ISPs, Section three provides a discussion of the impact of regulation on investment, Section four discusses the theoretical impact of Net Neutrality on investment, Sections five and six present our empirical approach, and section seven provides a description of our data. Section eight contains the discussion of our results. Concluding comments follow in section nine.

2 Regulation of ISPs

In 2015, the Federal Communications Commission adopted a policy, known as Net Neutrality, which controls how ISPs deliver data between edge providers and end-users. [2] The FCC's Title II Order established rules that prohibited ISPs, such as Verizon or Comcast, from throttling or blocking data that was transmitted by non-affiliated firms. It also prevented them from charging a rate for prioritized delivery of data packets (paid prioritization).[3] These rules were adopted because of the Commission's concern that the ISPs would use their control over access to end-users to harm edge competitors. For example, an ISP could block or

[2]Edge providers are those who, like Amazon or Google, provide content, services, and applications over the Internet, while end users are those who consume edge providers' content, services, and applications. Verizon v. FCC, 740 F.3d 623, 629.

[3]Title II Order, 30 FCC Rcd 5601, 5660, para. 110-132, and Appendix A, Final Rules, 8.5, 8.7, and 8.9 (2015). The FCC rules state 'Paid prioritization refers to the management of a broadband providers network to directly or indirectly favor some traffic over other traffic either (a) in exchange for consideration (monetary or otherwise) from a third party, or (b) to benefit an affiliated entity. Id., Appendix A, Final Rules, 8.9.

throttle Netflix's service, in order to increase the demand for its own video-on-demand products.[4]

Collectively these rules resulted in a mandate that enabled edge providers to access their end users without being charged a termination fee. Since the FCCs rules prohibit charges for prioritized service, it was only necessary for an edge provider and an ISP to reach an arrangement for best effort service.[5] When negotiating this rate, the edge provider could refuse to pay for transport. The ISP could not refuse a zero price, because failure to provide service would violate the rule that a service could not be blocked.[6] Consequently, a content provider, such as Netflix, would not need to pay for its transmission of data over an ISP's network.

The zero-price directive codified a long-standing Internet practice of not charging edge providers for transmitting data to end-users.[7] In 2010 the Commission observed, "Since the beginning of the Internet, Internet access providers have typically not charged particular content or application providers fees to reach the providers retail service end users or struck pay-for-priority deals, and the record does not contain evidence that U.S. broadband providers currently engage in such arrangements." [8]

The zero termination rate was established when text constituted the majority of traffic. Today, most traffic is video. Consequently latency is less tolerated by end-users. This change in demand has increased the cost of termination, which has, in turn, increased the economic efficiency of non-zero termination fees.[9] Also, in 2010, the FCC conjectured that providing edge providers with free access to end-users drives a 'virtuous cycle' in which innovations at the edges of the network enhance consumer demand, leading to expanded investments in broadband infrastructure that, in turn, spark new innovations at the edge.[10]

The nation's leading ISPs do not share the view that a zero-transport price stimulates ISP investments. Instead, they argue that the policy is unnecessary and disruptive. Companies, such as AT&T, have argued that, in light of the absence of systemic market failure prior to the adoption of the Net Neutrality Rules, there is no need for prescriptive federal regulation of the ISP industry. It added that the historical record prior

[4]Id., pars. 80-82.

[5]Best effort delivery describes a network service in which the network does everything it can do to deliver the data packets, but does not guarantee a level of service.

[6]Dissenting Statement Of Commissioner Ajit Pai, Title II Order, 30 FCC Rcd 5601, 5922.

[7]It is not unusual for one side of a two-way market to pay a zero, or even a negative price because their increased activity, due to the low price, stimulates activity on the other side of the market. For example, Rysman (2009) [28] observes that Microsoft may charge a negative price to video program developers in order to stimulate purchases of the Xbox

[8]Federal Communications Commission, Preserving the Open Internet (Open Internet Order) FCC 10-201, par. 76, December 23, 2010.

[9]Fed. Trade Commn, Broadband Connectivity Competition Policy, FTC Staff Report (2007), available at `http://www.ftc.gov/sites/default/files/documents/reports/broadband-connectivity-competition-policy/v070000report.pdf`, pp.2-4.

[10]Title II Order, par. 7. Verizon filed a suit in which it asked the court to rule that the Commission lacked a factual basis for its virtuous cycle theory. The District Court of Columbia found that the FCC had a factual basis for concluding that zero transport price stimulates ISP investment: "[T]he Commission has more than adequately supported and explained its conclusion that edge-provider innovation leads to the expansion and improvement of broadband infrastructure." Verizon v. FCC, 740 F.3d 623, 643-4.

to the adoption of the rules was one in which "the open Internet prospered, and the broadband ecosystem reached heights of unparalleled investment and innovation." [11]

Especially troubling to the ISPs is the fact that the FCCs 2015 net neutrality decision reclassified broadband access as a common carrier service.[12] Common carriers have a legal obligation to provide service at "just and reasonable" rates and to physically interconnect with other carriers, including competitors, on reasonable terms.[13] Between 2005 and 2015 wireline Internet broadband access had been classified as an information service. Therefore, they were not treated as common carriers.[14] During those years, the FCC tried to mandate Net Neutrality. Those attempts were twice found to be in violation of the statute by the District United States Court of Appeals "[b]ecause the Commission has failed to establish that the anti-discrimination and anti-blocking rules do not impose per se common carrier obligations."[15] In 2015, the Commission reclassified broadband access from an information service to a telecommunications service, thus giving it the authority to impose Network Neutrality as a common carrier obligation. The District Court of Appeals upheld this action.[16]

While subjecting the ISPs to common carrier regulation, the Commission declared that it would forbear from some forms of common carrier regulation. In its Open Internet Order, the Commission stated that it had adopted a "'light-touch approach. . .include[ing] no unbundling of last-mile facilities, no tariffing, no rate regulation, and no cost accounting rules"[17]

The FCC's claim that it adopted "light-handed" regulation provided little comfort to the ISPs. They shared a concern that regulatory creep would occur. This threat, along with the allegedly vagueness of the FCCs general conduct rule,[18] according to the ISPs, increased the risk that regulatory mandates would prove costly to implement and discourage capital investments in the Internet infrastructure needed to provide high quality connections in the face of increasing data demands.[19]

[11] Comments of AT&T Services, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108, July 17, 2017, https://prodnet.www.neca.org/publicationsdocs/wwpdf/71717att.pdf.

[12] See, for example, Andres V. Lerner and Janusz A. Ordover, An Economic Analysis of Title II Regulation of Broadband Internet Access Providers (Economic Analysis of Title II Regulation), Appendix A, Comments of Verizon, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108, July 17, 2017.

[13] 47 U.S.C. 201

[14] See In re Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, 20 F.C.C.R. 14853, 14862 par. 12 (2005) ("2005 Wireline Broadband Order"); In re Appropriate Regulatory Treatment for Broadband Access to the Internet Over Wireless Networks, 22 F.C.C.R. 5901, 5901-02 par. 1 (2007) ("Wireless Broadband Order").

[15] Comcast Corp. v. FCC, 600 F.3d 642; and Verizon v. FCC, 740 F.3d 623, 628 (quote).

[16] United States Telecom Assn v. FCC 825 F. 3d 674

[17] Open Internet Order, par. 37.

[18] Title II Order, Appenx A, Final Rules, 8.11.

[19] See, for example, Comments of Verizon, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108, July 17, 2017, p.34, https://prodnet.www.neca.org/publicationsdocs/wwpdf/71717verizon3.pdf; and Lerner and Ordover, Economic Analysis of Title II Regulation.

While the ISPs stated that Net Neutrality will unambiguously reduce their profits and investments, edge providers counter that their own capital investments will increase because Net Neutrality will reduce the risk of being charged monopoly termination prices or having their products blocked or degraded by ISPs.[20]

3 Impact of Regulation on Investment

The view that Net Neutrality and common carrier regulation will harm Internet investment is a major concern of the new, Republican controlled FCC. The FCC has recently proposed to eliminate Title II regulation in part because of its concern that the regulation will suppress ISP investment.[21] In support of its tentative conclusion, the FCC cited studies that suggest ISPs have reduced their investments in response to the threat, and eventual approval, of Title II regulation. A few analysts have used data from the financial reports of of ISPs to estimate how ISP capital expenditures changed following the reclassification of broadband access from an information to a Title II, common carrier service.

Singer (2016) [30] conducted the most widely cited capital expenditures study. He reported that following the consideration and adoption of Title II regulation, ISP capital expenditures dropped 5.6% between 2014 and 2016. [22] Singer's and similar studies are only suggestive of the impact of government regulation on capital expenditures because the accounting tabulations do not control for other factors that influence investments, such as investment cycles.[23] Neither did Singer address the lag between the adoption of a new public policy and the change in capital expenditures. An ISP does not instantly change its capital expenditures in response to a change in policy because of the time involved in scoping out projects, ordering and testing equipment, obtaining the necessary construction permits and rights-of-way permissions, undertaking demand studies, and other processes that are part of the capital expenditure process. George Ford reports that investment decisions occur with a delay of a two-or-so years following a policy change.[24] Whereas Dr. Singer's study was posted in May 2016,[25] less than two years after President Obama November 2014 endorsement of Title

[20]See, for example, Comments of Amazon, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108, July 17, 2017, pp. 2-5, https://prodnet.www.neca.org/publicationsdocs/wwpdf/71817microsoft.pdf; and Comments of Microsoft Corporation , In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108, July 17, 2017, p. 9, https://prodnet.www.neca.org/publicationsdocs/wwpdf/71717amazon.pdf

[21]Restoring Internet Freedom, par. 45.

[22]Federal Communications Commission, In the Matter of Restoring Internet Freedom (Restoring Internet Freedom), Notice of Proposed Rulemaking, April 27, 2017, FCC WC Docket No. 17-108, par. 45.

[23]For example, 2016 investments by wireless companies declined around the world because LTE technology rollouts had been largely completed. Colin Gibbs, Wireless capex 15% below estimates in Q4, signaling 'muted' spending in 2017, FierceWireless, February 21, 2017, http://www.fiercewireless.com/wireless/wireless-capex-down-15-q4-signaling-muted-spending-2017.

[24]George S. Ford, Net Neutrality, Reclassification and Investment: A Counterfactual Analysis, Phoenix Center for Advanced Legal & Economic Public Policy Studies, Perspectives 17-02, at 5, http://www.phoenix-center.org/perspectives/Perspective17-02Final.pdf. Ford characterized the type of analysis undertaken by Singer as largely uninformative. Id., p. 2.

[25]Hal Singer, 2016 Broadband Capex Survey: Tracking Investment in the Title II Era (Mar. 1, 2016), https://haljsinger.

II regulation, it is possible that the change in capital expenditures that Singer reports has little or nothing to do with the FCCs decision to reclassify Internet access.

Ford recently issued an econometric study that estimated the impact of Net Neutrality on capital expenditures of the telecommunications and broadcast industries. Ford used investment data for the years 1990 to 2015 to estimate the impact of the threat of Title II regulation on investments made by telecommunications and broadcasting companies. Unlike the Singer work, he takes into account other factors that influence investments by using a control group. The sectors of the economy that are included in the control group have a similar historical pattern of investment as the telecommunications and broadcasting industries, but have not been subject to Title II regulation. He used the difference-in-difference methodology to estimate what would have been the additional level of investment in the broadcasting and telecommunications industries if the FCC had not considered Title II Regulation. He concludes that the FCCs consideration of Title II regulation, starting in 2010, reduced investment in telecommunications and broadcasting by twenty to twenty-five percent.[26]

We have a few concerns with Ford's paper. Ford divides the years 1980 to 2015 into two periods. The treatment years, 2010-2015, are defined as the time period when the FCC was considering establishing Title II regulation of the ISPs. The non-treatment years, 1980 to 2009, are used to identify the trajectory of telecommunications investments when the Commission was not considering Title II regulation for the ISPs. The paper implies that the non-treatment years is an era when the FCC was not considering Title II ISP regulation. The paper does not address the fact that between the years 1980 and 2005, wireline carriers provided Internet access as a Title II service.[27] As part of the regulatory process, the major, incumbent wireline ISPs were required by the FCC to provide ISP competitors line sharing as an input for high-speed broadband access. The FCC promoted low prices for this wholesale service.[28] Furthermore, beginning around 1998, there were a number of court cases, and an FCC Notice of Proposed Rule-Making, in which federal authorities considered if Internet access via cable modem should be subject to Title II regulation. As part of that debate, both the FCC and the Federal Trade Commission considered requiring cable companies to provide wholesale cable modem access to competing ISPs.[29] This raises the question, which is not

wordpress.com/2017/03/01/2016-broadband-capex-survey-tracking-investment-in-the-title-ii-era/

[26] Ford, Net Neutrality, p.6.

[27] Federal Communications Commission, Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, FCC 05-150, August 5, 2005, https://apps.fcc.gov/edocs_public/attachmatch/FCC-05-150A1.pdf.

[28] FCC, Line Sharing Order, 14 FCC Rcd at 20912.

[29] According to the FCC, "[t]he issue of what, if any, regulatory treatment should be applied to cable modem service dates back to at least 1998 Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities, FCC 02-77, March 15, 2002, par.2. In this decision, the FCC confirmed that cable modem service was an information service. In October 2003

addressed by the paper, why would ISP investment decline in 2010-2015, when Title II regulation was considered, but not implemented, relative to the non-treatment years when Title II regulation was in-place for wireline carriers, and considered but not adopted for cable modem service? Stated differently, Ford's results are counter-intuitive because he finds that the threat of Title II regulation stifled telecommunications investment relative to a period when under Title II the FCC mandated low wholesale Internet access prices for one group of ISPs, and considered imposing a similar obligation on a second group.

We find the Ford study innovative, clever, and well presented. But unfortunately the study does not control for many crucial developments that affected telecommunications investments. Consequently Ford has not shown that the decline in investment was due to the threat of Title II regulation.[30]

It is challenging to statistically estimate the impact of Net Neutrality on investment because there is no variation in Network Neutrality policy across states. This lack of variation makes it difficult to statistically compare the impact of a change in policy since all areas of the United States are similarly impacted by the policy. Obtaining econometric estimates would be simpler if it was possible to compare investments in areas with and without Title II regulation. Whereas this type of variation is not available, there are alternative data sources that can be used to analyze the impact of policy on investments. One is to conduct cross-country comparisons. This is typically done by contrasting outcomes observed in different developed countries.

A second approach is to look at how State variation of public policy on a similar issue, affected investments. The Internet, which is a two-side market, uses packet switching to transmit data.[31] Packet switching is the platform for other two-sided markets, including credit cards, banking, and airline transactions. A 2008 study published by Gabel and Huang(2008) [17] econometrically estimated the concomitant effects that competition, regulation, market characteristics, and corporate ownership have on the deployment of packet switching services to business customers in the United States. Gabel and Huang found that the ratio of the regulated wholesale price of the unbundled loop divided by its historic cost had an economically significant

the Ninth Circuit reversed the FCC, in part, finding that cable modem service was part telecommunications service and part information service. 345 F.3d 1120 (9th Cir. 2003). In 2005 the Supreme Court overturned the Ninth's finding, and instead accepted that it was proper for the FCC to conclude that cable modem service was an information service. Natl Cable & Telecomms. Assn v. Brand X Internet Service, 545 U.S. 967 (2005).

[30]There are numerous other developments that arguably should have been explicitly taken into account by Ford (e.g., FIOS investment that declined due to the economics of fiber-to-the-home, rather than broadband policy). During Ford's treatment years, 2010-2015, the Commission was considering subjecting the wireless industry to Title II regulation. This issue was not on the agenda during the years 1998 to 2005. Some of the decline in treatment period investment identified by Ford may be attributable to reduced investment activity by wireless companies.

[31]"Broadly speaking, a two-sided market is one in which 1) two sets of agents interact through an intermediary or platform, and 2) the decisions of each set of agents affects the outcomes of the other set of agents, typically through an externality." Marc Rysman, The Economics of Two-Sided Markets, Journal of Economic Perspectives, 23 (2009), p. 125.

positive impact on the rollout of packet switching.[32] Stated differently, the higher the regulated wholesale price, the greater the likelihood that an incumbent local exchange company provided packet switching. Their finding supports the proposition that the Network Neutrality rules, which effectively set a zero termination price, suppresses broadband investment by ISPs.[33]

A third option is to employ an event study to explore the relationship between anticipated changes in net neutrality regulations, and stock market returns of those companies impacted by these events. Through regression analysis we estimate if the news events lead to excess returns, that is a statistically significant change in returns beyond that which can be explained by simple market beta exposure. The events are potentially significant in terms of providing information that investors may use to reassess the future earnings prospects of the firms. A positive stock market reaction is consistent with investors anticipating additional investments in positive NPV projects, while a negative reaction is consistent with investors anticipating a loss of such investment opportunities.[34]

We are not the first to use event analysis to study the impact of Net Neutrality policy on market returns of investors. Robert Crandall used event analysis to evaluate the impact of the District Courts decision in *Verizon v. FCC*, as well as, a number of subsequent regulatory events leading to Title II regulation, on the stock prices of ISPs and new and traditional media companies. He found, "surprising[]ly]," that the regulatory developments had little economic or statistical impact on the return of these firms.[35] We reach a different conclusion.

4 Theoretical Impact of Net Neutrality on Investment

Crandall's analysis of both ISPs and media companies is consistent with the analysis taken in the theoretical literature. The Net Neutrality theoretical literature appropriately distinguishes the effect the rules have on edge providers and ISPs. The rules are likely to have a positive effect on edge providers' investment[36] because it reduces the costs they incur reaching end-users and the risk that a vertically integrated ISP will throttle or block their transmission.

[32]The ratio of the wholesale to historic price has been used in the literature to measure the variation in state communication policy.

[33]David Gabel and Guang-Lih Huang, Promoting Innovation and the Deployment of Advanced Telecommunications Services to Business, Contemporary Economic Policy, April 2008, pp. 229-47.

[34]We are not asserting anticipated increases or decreases in positive NPV projects as the only possible explanation for the excess returns of the impacted companies, but simply view the explanation as consistent with excess returns.

[35]Robert Crandall, The FCCs Net Neutrality Decision and Stock Prices, Review of Industrial Organization, June 2017, Volume 50, Issue 4, pp. 555.

[36]Joshua Gans, Weak versus Strong Net Neutrality (November 18, 2014). Rotman School of Management Working Paper No. 2439360, https://ssrn.com/abstract=2439360orhttp://dx.doi.org/10.2139/ssrn.2439360

The theoretical impact of net neutrality on ISP investment is less clear. Nicholas Economides recently reviewed the literature and concluded: "one cannot claim that network neutrality should result in lower investment by ISPs. It is equally possible that Network Neutrality will prompt ISPs to invest more."[37] A similar sentiment was expressed in a recent submission to the FCC by a group of economic scholars. They concluded that "[t]he literature gives mixed results because the investment incentive is sensitive to how content providers and consumers respond to prices and how consumers value content."[38]

In 2010 The FCC posited that Net Neutrality has a positive impact on ISP investment due to a 'virtuous cycle of innovation: "openness enables a self-reinforcing cycle of investment and innovation in which new uses of the network lead to increased adoption of broadband, which drives investment and improvements in the network itself, which in turn lead to further innovative uses of the network and further investment in content, applications, services, and devices." [39] Theoretically, as outlined in the prior paragraph, it is hardly clear that openness will result in increased network, that is, ISP investment. It is possible that openness will stimulate ISP investment, but the degree to which this has or will occur is something that has to be resolved empirically.[40]

As previously stated, in this paper we estimate the impact of events on the stock market returns for firms affected by net neutrality regulation. We are not directly measuring the impact of events on investment. Rather the connection between events and investments is as follows. If an event results in an abnormal positive return, this implies an increase in the discounted present value of the firm's future free cash flows. The increase in discounted present value may be associated with a decrease in the firm's discount rate, or increases in free cash flows.

The regression analysis estimates the impact a news event has on investor's earnings. This is done by including in the regression a "dummy" variable that has a value of one when the news announcement is made, and zero for all other dates. The information or "news" associated with the dummy variable when the dummy is found significant is consistent with investors using the information to reassess the future prospects of the firm. An upwards revision or a downwards revision are both possible.

New projects will require new investments. Therefore, an increase in returns associated with an event

[37] Comments of Prof. Nicholas Economides, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108, July 17, 2017, pp. 6-7.

[38] Economic Scholars Summary of Economic Literature Regarding Title II Regulation of the Internet, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108, July 15, 2017, p. 6.

[39] Title II Order, par. 2 (first quote); and Open Internet Order, par. 3 (second quote).

[40] Even if Net Neutrality reduces ISP investment, total investment could be positive if the increase in edge investment more than offsets the decline in ISP capital expenditures.

found to be significant implies that the event causes investors to readjust their expectations of the company's future earning prospects. One critical reason for such a reassessment is that the event signals a change for the firms that alter their investment incentives. Changes that lower investors' expectations of future earning prospects, such as having to provide access without adequate pricing, will make some otherwise good investments appear as negative NPV projects. For example, it is entirely possible that projects may appear as negative NPV projects because of regulatory restrictions on permissible prices. Once these restrictions are removed, that is firms can charge an unregulated price, the "same" projects appear as positive NPVs.

5 Standard Market Model and Effects of Net Neutrality Regulation

The standard market model is based on the CAPM developed by Sharpe(2007) [29], Lintner(1965)[22] and Mossin (1966)[25]. As Bollerslev et.al.(1988)[5] comment, "Even though numerous studies over the past half-century have called into question the ability of the capital asset pricing model(CAPM) to fully explain the cross-section of expected stock returns, the beta of an asset arguably remains the most commonly used systematic risk measure in financial practice." In the standard market model, the beta of an asset is the risk measure that does the heavy lifting in terms of explaining returns; beta measures the market exposure of an asset.

Following Crandall(2017)[7], we introduce dummy variables to reflect variation in returns not captured by beta. We expand the number of dummies to reflect six events (eq. 1). This allows our analysis to determine whether the returns of our three groupings of firms, ISPs, as well as Old and New Media, were impacted significantly by movements toward or away from Net Neutrality regulation beyond what is captured by simple market exposure measured by beta.

$$r_{it} = \alpha_i + \beta_i M_t + \Sigma \beta_j D_j + u_{it} \tag{1}$$

where r_{it} is the daily return on the ith equity on day t; M_t is the return on the overall market on day t; D_j, j=1,...,6 are dummy variables that take the value of unity on the day of the event and zero otherwise; and u_t is the error term. A statistically significant dummy variable indicates an abnormal return associated with the event (an excess return statistically different from a simple average of market model excess returns).

6 Empirical Approach

Following Crandall, we present the CAPM results for twenty one firms.[41] The firms have been divided into three categories: ISPs, traditional Media, and New Media companies. ISPs are primarily telephone and cable companies that provide the "last mile" data connection to Internet end-users. The traditional media companies, such as Viacom and Disney, are primarily focused on producing content. The new media companies, such as Facebook and Google, operate platforms that are used to distribute content.

There are three important differences in Crandall's and our analysis: The time period of our analysis is longer, we consider more recent events, and create a value weighted index of companies in three groupings to assess the signigicance of the events estimated from the market model. Undertaking an analysis based on value-weighted index eliminates some of the noise dummies may capture from the presence of idiosyncratic risk that a portfolio approach reduces, and also adjusts for the impact of firm size.

We now provide a description of each of the six events along with reasons why the events have at least the potential to matter to investors in that they may provide unanticipated information interpreted by investors as either "good news" events increasing returns, or "bad news" events decreasing returns.[42]

Verizon v. FCC–January 14, 2014

In 2010 the Federal Communications Commission issued its Open Network Order. As discussed above, the Order established rules that prohibited ISPs from throttling or blocking data transmitted by non-affiliated firms, or for charging a rate for prioritized delivery of data packets (paid prioritization).[43] Collectively these rules resulted in a mandate that edge providers be able to reach end users without having to pay a termination charge.

The ISPs filed an appeal to the decision in the District Federal Appeals Court. There was uncertainty regarding how the Court would rule. The Courts January 14, 2014 ruling vacated the rules on the grounds that the Communications Act prohibits the Commission from imposing common-carriage-type regulation, price regulation, on information services. In 2005 the ISPs were classified as information services by the FCC.

Arguably the Courts decision should have been beneficial to the ISPs because it would have increased

[41] Crandall reported results for twenty-two firms. Two of his companies were subsequently acquired. DirectTV was acquired by AT&T. Time Warner Cable was purchased by Charter Communications. We have added a firm to our analysis, Facebook, that was not included in Crandall's analysis.

[42] Two of our six events were included in Crandall's study: The District Court's 2014 ruling and Obama's endorsement of Title II regulation.

[43] Title II Order, paras. 110-132.

their pricing options, and therefore would fall into the "good news" event category leading to an increase in returns. Conversely, it would be a "bad news" event for media companies because their content distribution costs could increase absent the Open Internet Rules.

Obama Advocates for Title II Regulation–November 10, 2014

Later in 2014 the FCC again initiated a rule making proceeding in which it considered how to maintain an Open Internet. The FCC received some unexpected guidance from the President on this matter. On November 10, 2014, President Obama announced his support for Title II regulation. It is highly unusual for the President to publicly offer advice on the outcome of this type of administrative proceeding.

As Title II regulation was perceived as potentially more intrusive relative to the earlier rules, Obama's intervention is a "bad news" event for ISPs. Whereas the rules were designed to protect edge content providers, it was a "good news" event for media companies.

Zero Rating–December 15, 2015

On March 12, 2015 the FCC reclassified broadband access as a telecommunications service, thus giving it the authority to impose Network Neutrality as a common carrier obligation. Pursuant to its goal of maintaining an Open Internet, on December 15, 2015 the FCC sent out letters to providers of zero-rating services asking for information about this service. Zero rating is an industry practice in which a mobile provider exempts certain content from data allowances in certain wireless plans.[44] The FCC was concerned that the free service was offered in a way that favored the ISPs affiliates information services. ISPs, such as AT&T, contend that the investigation is "a clear example of how the Title II Order and the Internet Conduct Standard create regulatory uncertainty and encourage regulatory creep."[19], par. 110.

Consistent with the view expressed by AT&T, there are reasons for investors to believe that the rate investigation was burdensome and therefore a "bad news" ISP event. Media companies' investors may also see it as a bad news event in that the investigation could have resulted in closing out a new mode of distributing content. On the other hand, the media companies could have viewed the regulatory intervention as "good news" because it signaled that the Commission would not tolerate exclusionary offerings.

United States Telecom Assn v. FCC–June 14, 2016 On March 12, 2015 the FCC reclassified broadband Internet access as a telecommunications service. The United States Telecom Association challenged the decision in court. On June 14, 2016, the District Court of Appeals upheld the FCC's Title II

[44] https://bits.blogs.nytimes.com/2015/12/17/f-c-c-asks-comcast-att-and-t-mobile-about-zero-rating-services/

decision.[45]

Since the Court approved the FCC's reclassification of Internet access as a common carrier service, there are reasons why investors would see the Courts approval of Title II regulation as bad news for the stocks of ISPs, and good news for media companies.

Election of Donald Trump–November 9, 2016

Donald Trump was elected President of the United States on November 8, 2016. According to "Industry analysts at New Street Research there has not been a lot of detail in Mr. Trumps [campaign] pronouncements regarding telecom and media policy, with the exceptions of a statement that he would reverse the FCCs Title II reclassification of broadband services and that he would remove unspecified libel protections."[46] Investors would see the election of President Trump as a good news event for ISPs and a bad news event for media companies.

Trump Selects Ajit Pai to be Chair of the FCC–January 23, 2017

On January 23, 2017 President Trump announced that he selected Ajit Pai to be the new chair of the FCC. Pai is known to have opposed the reclassification of broadband services as telecommunications services. The Los Angeles Times reported that the new chair wanted to take a "'weed whacker" to the net neutrality rules.[47] In light of Pai's opposition to common carrier regulation of the ISPs, a position supported by the ISPs, investors would view Pai's appointment as good news for ISPs and bad news for media companies.

7 Data

We obtained daily adjusted closing prices for our twenty one stocks from Yahoo!Finance. The market rate and the risk free rate are from the Kenneth French Data Library.[48] The market rate is the market return in excess of the risk-free rate, where the market is represented as a value-weighted return of all CRSP firms incorporated in the US and listed on the NYSE, AMEX, or NASDAQ. The risk free rate is the one-month Treasury bill rate from Ibbotson Associates and provided by K. French.

Our sample of daily returns begins on January 2, 2013 and ends on June 30, 2017. Summary statistics are shown in Table 1. There are a total of 21 companies divided into 3 groups, ISPs, traditional or "old" media companies, and new media companies.

[45] United States Telecom Assn v. FCC 825 F. 3d 674.
[46] Telecommunications Reports , November 15, 2016, Vol. 82, No. 22.
[47] http://www.latimes.com/business/la-fi-pai-fcc-chairman-20170123-story.html
[48] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

The average daily return of the value weighted indices for the IPS's and the traditional media companies are about the same as the market for the sample period. The new media companies have an average daily return that is more than twice the size of the market.

The new media companies have the highest standard deviation of returns among the three groups, and the ISPs have the lowest. The standard deviation of market returns is roughly one half that of the new media companies.

The market, ISPs, and old media companies have a negative skewness, while the returns for New Media group has a positive skewness.

The ISP's have a large positive kurtosis, which appears to be heavily influenced by CenturyLink. The market and the two media groups also have positive kurtosis.

	Mean	**Std. Dev**	**Skew**	**Kurt**
Mkt	0.06	0.80	-0.39	2.19
T	0.03	0.92	-0.32	2.40
VZ	0.02	1.00	-0.09	1.41
FTR	-0.08	2.49	-0.56	7.36
CHTR	0.13	1.68	0.77	5.04
S	0.03	3.12	-0.02	8.89
TMUS	0.11	1.86	-0.78	9.08
CMCSA	0.07	1.17	-0.06	1.70
CTL	-0.02	1.73	-3.19	48.49
DISH	0.05	1.71	-0.01	2.57
Group 1 Index	0.07	1.10	-0.95	9.64
CBS	0.05	1.48	0.17	1.32
DIS	0.07	1.15	-0.62	7.41
TWX	0.08	1.42	0.03	24.16
SNE	0.11	2.07	0.59	5.84
VIA	-0.02	1.84	-1.64	16.74
FOX	0.02	1.39	-0.36	3.65
Group 2 Index	0.09	1.23	-0.22	8.76
GOOG	0.08	1.41	1.76	18.30
NFLX	0.21	2.98	1.97	25.74
AABA	0.09	1.85	-0.07	2.91
AAPL	0.06	1.55	-0.69	7.49
AMZN	0.12	1.85	0.14	9.68
FB	0.15	2.05	2.16	25.75
Group 3 Index	0.18	1.61	0.91	9.82

Table 1: Summary Statistics for Returns in Percents

8 Discussion of Results

Appendix A provides the statistical results for the twenty one publicly traded firms. In addition, for each of the three categories, we have built an index that is a value-weighted index of the individual stocks returns for a specified grouping of companies. Our discussion focuses on the Group/Category index because it is value-weighted and employs an average beta for the specific groupings of firms eliminating some of the noise that comes from single firm estimates of beta, especially for short windows.

Table2 is an extract of the Group/Category index dummy variable results that are reported in the Appendix A. The two-tailed statistically significant coefficient estimates are identified in bold. A one-tailed test may be more appropriate if we were to only test the alternative hypothesis, for example, that the coefficient for the Trump dummy is positive. However, a priori we did not want to restrict the sign of the dummies we investigated in order to achieve greater signficance.

	VZ v. FCC	Obama Supports Tittle II Regulation	Zero Rating Inves- tigation	US Telecom Assn v. FCC	Trump	Pai
Group	**1/14/2014**	**11/10/2014**	**12/15/2015**	**6/14/2016**	**11/9/2016**	**1/23/2017**
ISP	-0.201	**-3.059******	0.205	0.301	**1.606***	0.766
	-0.218	-3.331	0.223	0.328	1.747	0.834
Old Media	-0.880	0.208	0.767	0.727	**-2.080****	0.084
	-0.940	0.222	0.819	0.776	-2.219	0.776
New Media	0.758	-0.083	-2.195	0.597	**-2.717****	1.027
	0.562	-0.062	-1.626	0.443	-2.011	0.761

$^{****}p < 0.001$, $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 2: Dummy Variable Coefficients for Group Indices
(t-statistics shown beneath coefficient estimates)

8.1 ISP's

Two of the six events have a statistically significant effect on the index of ISP returns. The signs of the statistically significant ISP dummy coefficients are consistent with what ISP firms have argued. The expected abandonment or loose enforcement of net neutrality regulation associated with the election of Donald Trump, increased the return on the ISP return index beyond that captured by market movements. On the other hand, Barack Obamas public support for Title II regulation significantly reduced the return on the index.

Two of our six events were previously analyzed by Crandall. We obtain stronger statistically significant results for one of the two events, Obama's endorsement of Title II regulation. We believe there are two reasons for this difference. First, the time span of our data sets is not identical. Crandalls analysis considers stock prices from December 31, 2013 through May 4, 2015. Our data starts on January 2, 2013 and ends June 30, 2017. Secondly, Crandall estimated the CAPM model using ordinary least squares for single companies and did not run his model separately for the three groups of firms.

Investors did not appear to be terribly troubled with the FCCs zero rating investigation. In other words, it was a "no news" event. While the ISPs represented that this type of regulatory creep was disruptive, the equity markets reaction was muted. The lack of a statistically significant response for the index may reflect that the market had already built this possibility into the ISPs equity prices.[49]

The two court decisions were also "no news" event without any significant effect on returns for the index beyond what is picked up by the market exposure. The muted market response to the 2014 court decision to vacate the Net Neutrality rules may be due in part to the tone of court's decision. Some analysts immediately noted that the court had effectively "g[iven] the FCC a roadmap to reconstitute and even improve on its original decision."[35]

Donald Trumps selection of Ajit Pai as chair of the FCC is not a signficant event in terms of impacting the returns of three groupings of firms. This suggests that the loose regulatory framework and abandonment of net neutrality that seems more likely with Pai as chair was already reflected in stock prices, and the selection of Pai adds little information of value for investors. Hence it was another "no news" event.

8.2 Media Companies

First, it is striking that only Trump's election has a statistically significant effect on the old and new media companies returns. The negative return on November 9, 2016 may have been driven by the expectation that under President Trump, Net Neutrality would be eliminated and this would increase the distribution costs that the old and new media companies would have to incur.[50]

[49] As shown on the Appendix, two companies, Centurylink and T-Mobile, experienced an abnormal positive return when the investigation was announced. Centurylink's stock price may have increased because this landline's market position, relative to its mobile competitors, would improve if zero rating was deemed illegal. T-Mobiles stock may have increased in value because the chair of the FCC had already stated that T-Mobiles zero rating product was "'highly innovative and highly competitive.'" John Anon, No FCC Concerns With T-Mobiles Binge On and Net Neutrality, November 19, 2015, https://www.androidheadlines.com/2015/11/no-fcc-concerns-with-t-mobiles-binge-on-net-neutrality.html The market therefore may have perceived T-Mobiles position improving relative to its mobile rivals as the outcome of the FCC investigation.

[50] We do not think the decline in old and new media returns was due to the other issue discussed by Trump during the campaign–his interest in changing the libel laws. For, among other reasons, making a libel claim is challenging in light of the media's first amendment rights, and because libel law is a state law. The President's influence over state law is limited or non-existent. Adam Liptak, "Can Trump Change Libel Laws?", New York Times, March 30, 2017.

It is paradoxical that while the Trump victory had a statistically significant impact on the return of media equities, no similar effect was found with Obama's endorsement of Title II regulation. This may be because the particulars of Title II regulation were hardly known when Obama endorsed this form of regulation, and consequently the markets had to weight two offsetting possibilities. Such "on the one hand" while "on the other hand" calculations left investors unsure whether the event would significantly affect the media firms' future stream of earnings. Uncertainty was less present when Trump was elected. Investors had a good sense of how the media companies businesses would be affected by the elimination of Title II regulation. Between the years 2005 and 2010 there was no Title II regulation and therefore there was greater clarity about how the media firms would be affected by the elimination of Title II regulation that had been in place for over a year.

The table reports no statistically significant coefficients for a number of other events. One possible explanation of "no meaningful news" associated with these events is that any change in earnings associated with the policy announcement may have been too small to generate a statistically significant effect on the media companies equity returns. [[20], p. 551].[51]

8.3 Net Neutrality and Investment

We have associated the election of President Trump with a change in policy that will lead to the end of Title II regulation of the ISPs. The econometric results for the Trump election, along with former President Obama's support for Title II regulation, is inconsistent with the "virtuous cyle of innovation" hypothesis.[52] Obama's support for Title II regulation likely led investors to expect a reduction in ISP investment, while Trump's victory in November 2016 likely led investors to expect an increase in ISP investment, all else equal. As we describe above, the abnormal positive returns is consistent with an increase in positive net present value projects that implies an increase in investments.

The same logic suggests that investors in media companies anticipated a decline in future earnings from the election of Trump. The negative impact of the election on media companies' returns suggests that for investors the anticipated regulatory changes under a Trump Administration generated negative investment incentives in that fewer positive NPV projects will be found, and therefore, lower capital investments will

[51] Another reason for the "no meaningful news" event is that the information may have already been incorporated into the market prices. This explanation seems particularly appropriate for the selection of Pai as the next chair of the FCC.

[52] We are only claiming that the inconsistency exists for the events we studied. It is possible that the "virtuous cycle of innovation" is empirically supported for an earlier era when the market was less mature and the introduction of new content, such as Netflix's video-on-demand service, could have stimulated ISP investment.

result. We are unable to state which effect is larger–the likely increase in ISP investment or likely decline in media investment.

We have reported the impact of events on both ISPs and edge suppliers. Proper economic analysis dictates that the change in net present value, or investment, of both ISPs and media companies be considered when evaluating the efficiency of the Net Neutrality rules. Both sides of the market are important engines of economic growth. Unfortunately, much of the current analysis has ignored investments made on the edge, and therefore fails to consider the entire Internet ecosystem (i.e., end-users, ISPs, content providers).

8.4 Sensitivity Analysis

While we have segmented the sample of firms into 3 groups, we recognize that the group classification is not cut and dry. For instance, the ISP group contains Comcast, and Comcast owns NBC, a traditional media company. We perform a principal component analysis on the returns for the companies in our study to determine whether there is support for our three groupings. A set of four bi-plots of the first two eigenvectors of the returns are shown in the Appendix C. The first bi-plot Figure 1 contains all of the firms. Looking at all the firms together in Figure 2 there is no clear grouping or separation of the firms. There is a continuum from new media to ISPs, with significant overlap. We also consider bi-plots for each pair of groupings. Figure 2 shows the bi-plot for ISP's and traditional media firms. We find a continuum from traditional media to ISPs, again with overlap. Figure 3 is the bi-plot for Traditional and New media companies. There is a sharp distinction between the two groups, with no overlap. Finally, Figure 4 contains the ISP's and the New media companies. While the distinction between the two groups is not as clear as in Figure 4, the New media companies are in the bottom left quadrant, separate from the ISP's.

In order to determine the relevance of overlap among groupings, we combine the firms into different groups. Table 3 contains regression results from three alternative index definitions. The first group is ISP's without Comcast. The second is Traditional Media with Comcast, and the third group combines the ISP's and Traditional Media.

Removing Comcast from the ISPs, and placing it in the traditional media category, changes the sign and significance of the Obama dummy. The Obama letter no longer has a statistically significant impact on the ISPs, but it does result in a statistically negative impact on the old media index. These two changes likely reflect that, as reported in the Appendix, Comcasts' returns experienced a statistically significant decline when Obama announced his support for Title II regulation.

	VZ v. FCC	Obama Supports Tittle II Regulation	Zero Rating Inves-tigation	US Telecom Assn v. FCC	Trump	Pai
Group	**1/14/2014**	**11/10/2014**	**12/15/2015**	**6/14/2016**	**11/9/2016**	**1/23/2017**
ISP's w/o CMCSA	-0.256	-1.263	0.423	0.258	**1.999***	0.945
	-0.248	-1.225	0.410	0.250	1.937	0.917
Old Media w/CMCSA	-0.619	**-2.941**** **	0.400	0.666	-1.330	-0.014
	-0.712	-3.385	0.46	0.766	-1.528	-0.016
ISP's plus Old Media	-0.875	**-4.204*** **	0.823	0.924	0.669	0.932
	-0.607	-2.919	0.571	0.642	0.464	0.647

$^{****}p < 0.001$, $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 3: Alternative Industry Definitions

The removal of Comcast from the ISPs does not change the statistical significance of the ISP Trump election coefficient. His November 8, 2016 victory continues to have a statistically significant positive effect on the ISP returns. On the other hand, the addition of Comcast into the Old Media category leaves this group's coefficient negative, but it is no longer statistically significant.

We find the initial results, rather than the results from the alternative groupings, more compelling because approximately 66 percent of Comcast's operating income comes from its cable communications division. Twenty five percent of its income comes from cable networks, broadcast television, and filmed entertainment. The remaining nine percent comes from theme parks.[53] We believe that the greater percentage of Comcast's operating income that comes from its cable communications division supports our original grouping of Comcast as an ISP.

In addition, Appendix **??** provides group results based on a panel data estimation with cluster robust standard errors.

9 Concluding Comments

There are plenty of reasons that could be offered to explain why the six events used in our analysis should "matter." But our focus is on how investors assess the likely impact of the events on the future earning prospects of the firms. We use the market model to set the bar for "mattering." This narrows our focus as to whether the events impact returns apart from what is expected from simple market exposure measured by beta. If we define a "threshold event" as an event significant enough to impact the returns of all three

[53]Comcast 10-K For Year Ending December 31, 2016, p.40.

groupings of firms, we find that only the Trump election fits the bill. However, for the ISPs, Obama's letter was also significant. Our main conclusion is that relaxing or abandoning Title II Net Neutrality regulation is a significant threshold event that negatively impacts returns of traditional and new media companies, and has a positive impact on the returns of ISPs. Our focus on whether net neutrality regulatory changes "matter" to investors employs three groupings of firms. Our analysis extended beyond ISPs because the media companies play an important role in the Internet ecosystem. We believe our broader approach is consistent with proper economic analysis and is a productive path forward for assessing net neutrality regulatory changes from the perspective of investors.

References

[1] Amazon, *Comments of Amazon, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108*, July 17, 2017.

[2] Anon, John, *No FCC Concerns With T-Mobiles binge on* Androidheadlines November 19, 2015.

[3] AT&T, *Comments of AT&T, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108*, July 17, 2017.

[4] Comcast Corp. v. FCC, *United States Court of Appeals for the District of Columbia*, 600 F.3d 642, 2010.

[5] Bollerslev, Tim, Robert F. Engle and Jeffrey M. Wooldridge, *A Capital Asset Pricing Model with time-varying covariances*, Journal of Political Economy, 1988, Vol. 96.1, pp. 116-131.

[6] Comcast, *10K Filing* 2016.

[7] Crandall, Robert, *The FCC's Net Neutrality Decision and Stock Prices* , Review of Industrial Organization, 2017 Vol. 50 year=2017,

[8] Economic Scholars , *Economic Scholars Summary of Economic Literature Regarding Title II Regulation of the Internet, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108*, July 15, 2017.

[9] Economides, Nicholas, *Comments of Prof. Nicholas Economides, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108*, July 17, 2017.

[10] Federal Communications Commission, *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities*, March 15, 2002, FCC 02-77.

[11] Federal Communications Commission, *In re Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities ("2005 Wireline Broadband Order")*, FCC Record, 2005, Vol. 20, PP. 14853.

[12] Federal Communications Commission, *In re Appropriate Regulatory Treatment for Broadband Access to the Internet Over Wireless Networks ("Wireless Broadband Order ")* , FCC Record, 2007, Vol.22, pp. 5901.

[13] Federal Communications Commission, *Preserving the Open Internet (Open Internet Order)* , FCC Record, December 23, 2010, FCC 10-201.

[14] Federal Communications Commission, *In the Matter of Protecting and Promoting the Open Internet, Report and Order on Remand, Declaratory Ruling, and Order (Title II Order)*, FCC Record, 2015 Vol. 30, pp. 5601-6000.

[15] Federal Communications Commission, *In the Matter of Restoring Internet Freedom: Notice of Proposed Rulemaking*, April 27, 2017, FCC WC Docket No. 17-108.

[16] Ford, George, *Reclassification and Investment: A Counterfactual Analysis* , Phoenix Center for Advanced Legal & Economic Public Policy Studies, 2017.

[17] Gabel, David and Guang-Lih Huang, *Promoting Innovation and the Deployment of Advanced Telecommunications Services to Business*, Contemporary Economic Policy, 2008, pp.229-47.

[18] Gans, Joshua S.,*Weak versus Strong Net Neutrality* ,Rotman School of Management Working Paper, 2014, Vol. 2439360.

[19] Israel, Mark, Allan Shampine and Thomas Stemwedel, *Declaration of Mark Israel, Allan Shampine & Thomas Stemwedel, In the Matter of Restoring Internet Freedom* FCC WC Docket No. 17-108 July 17, 2017.

[20] Kim, E. Han and Vijay Singal, *Mergers and Market Power: Evidence from the Airline Industry* American Economic Review, 1993.

[21] Lerner, Andres V. and Janusz A. Ordover, *An Economic Analysis of Title II Regulation of Broadband Internet Access Providers (Economic Analysis of Title II Regulation), Appendix A, Comments of Verizon, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108*, July 17, 2017.

[22] Lintner, John, *Security prices, risk, and maximal gains from diversification*, The Journal of Finance, 1965, Vol. 20.4, pp. 587-615.

[23] Liptak, Adam, *Can Trump Change Libel Laws?* New York Times, 2017.

[24] Microsoft, *Comments of Microsoft, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108*, July 17, 2017.

[25] Mossin, Jan, *Equilibrium in a capital asset market* , Econometrica, 1966, Vol. 34.3, pp. 125-43.

[26] New York Times, *FCC Asks Comcast, AT&T and T-Mobile About Zero Rating Service* 2015.

[27] Pai, Ajit, *Dissenting Statement Of Commissioner Ajit Pai, Title II Order* , FCC Record, 2015 Vol. 30, pp. 5922.

[28] Rysman, Marc, *The Economics of Two-Sided Markets,* , Journal of Economic Perspectives, 2017, pp. 125-43.

[29] Sharpe, William, *Investors and Markets: Portfolio Choices, Asset Prices, and Investment Advice*, Princeton University Press, Princeton, 2007.

[30] Singer, Hal, *2016 Broadband Capex Survey: Tracking Investment in the Title II Era*, 2016.

[31] Telecommunications Reports, November 15, 2016 Vol. 82.

[32] *United States Telecom. Assn v. FCC, 825 F. 3d 674, US Court of Appeals*, 2015.

[33] Verizon v. FCC, *United States Court of Appeals for the District of Columbia*, 740 F.3d 623, 2015.

[34] Verizon, *Comments of Verizon, In the Matter of Restoring Internet Freedom, FCC WC Docket No. 17-108*, July 17, 2017.

[35] Werbach, Kevin, *The Court's Net-Neutrality Ruling Isn't Actually That Bad* The Atlantic, January 15, 2014.

10 Appendix A - Company Regression Estimates

			VZ v. FCC		Obama Supports Title II Regulation		Zero Rating Inves-tigation	US Telecom Ass'n v. FCC		Trump		Pai		
Ticker	Beta	t-stat	1/14/2014	t-stat	11/10/2014	t-stat	12/15/2015	6/14/2016	t-stat	11/9/2016	t-stat	1/23/2017	t-stat	Adj. R-Sq
CHTR	0.939	16.838	1.139	0.761	-6.827	**-4.566****	0.837	-0.369	-0.247	1.395	0.932	0.275	0.184	0.211
CMCSA	0.914	26.820	0.166	0.181	-4.394	**-4.807****	-0.367	0.551	0.603	0.119	0.130	-0.181	-0.198	0.395
CTL	0.881	14.944	-1.528	-0.966	0.813	0.515	2.963	**1.874***	-0.548	-0.347	-0.680	-0.430	1.296	0.820	0.165
DISH	1.055	19.007	-0.913	-0.612	-0.396	-0.266	-0.281	-0.189	0.329	0.221	0.655	0.439	2.491	**1.672***	0.241
FTR	1.062	12.109	0.399	0.170	0.719	0.306	-0.583	-0.248	-0.482	-0.205	-2.339	-0.994	1.870	0.795	0.111
S	1.230	11.204	-0.483	-0.164	2.982	1.013	-1.015	-0.344	1.931	0.656	10.831	**3.674****	3.170	1.077	0.110
T	0.594	20.091	-0.137	-0.173	0.411	0.518	-0.023	-0.029	0.590	0.745	0.348	0.438	1.495	1.886	0.263
TMUS	0.981	15.604	0.199	0.118	1.238	0.734	3.266	**1.936***	0.800	0.475	3.449	**2.043****	1.268	0.753	0.183
VZ	0.615	18.986	-0.587	-0.675	-0.464	-0.534	-0.443	-0.509	0.926	1.066	-0.445	-0.511	-0.399	-0.459	0.239
Index_Grp1	0.749	21.881	-0.201	-0.218	-3.059	**-3.331****	0.205	0.223	0.301	0.328	1.606	**1.747***	0.766	0.834	0.303

			VZ v. FCC		Obama Supports Title II Regulation		Zero Rating Inves-tigation	US Telecom Ass'n v. FCC		Trump		Pai		
Ticker	Beta	t-stat	1/14/2014	t-stat	11/10/2014	t-stat	12/15/2015	6/14/2016	t-stat	11/9/2016	t-stat	1/23/2017	t-stat	Adj. R-Sq
CBS	1.146	26.221	-1.779	-1.516	1.223	1.043	-0.193	-0.165	1.586	1.353	-2.197	**-1.871***	-0.016	-0.014	0.377
DIS	0.952	29.379	0.488	0.562	-0.574	-0.660	1.476	**1.697***	1.012	1.165	-1.130	-1.299	-0.244	-0.280	0.434
FOX	1.038	24.725	-1.470	-1.304	-0.154	-0.137	-0.747	-0.663	-0.110	-0.098	-0.560	-0.496	0.202	0.179	0.348
SNE	1.239	18.300	-1.577	-0.867	3.941	**2.170****	-2.011	-1.107	0.740	0.408	-3.294	**-1.811***	0.090	0.050	0.228
TWX	0.915	20.146	-1.292	-1.060	0.100	0.082	-0.335	-0.275	-0.361	-0.296	-2.819	**-2.312****	0.921	0.757	0.262
VIA	1.127	18.791	-0.949	-0.590	-1.022	-0.635	-0.296	-0.184	0.147	0.092	-0.012	-0.008	-0.267	-0.166	0.235
Index_Grp2	1.011	28.963	-0.880	-0.940	0.208	0.222	0.767	0.819	0.727	0.776	-2.080	**-2.219****	0.084	0.089	0.425

			VZ v. FCC		Obama Supports Title II Regulation		Zero Rating Inves-tigation	US Telecom Ass'n v. FCC		Trump		Pai		
Ticker	Beta	t-stat	1/14/2014	t-stat	11/10/2014	t-stat	12/15/2015	6/14/2016	t-stat	11/9/2016	t-stat	1/23/2017	t-stat	Adj. R-Sq
AABA	1.232	21.073	1.406	0.896	1.337	0.853	-0.026	-0.017	2.739	**1.747***	-1.691	-1.077	1.172	0.747	0.282
AAPL	0.931	18.384	0.887	0.652	-0.485	-0.357	-2.822	**-2.076****	0.286	0.211	-1.536	-1.129	0.322	0.237	0.228
AMZN	1.194	20.104	0.241	0.151	1.291	0.811	-1.253	-0.786	0.741	0.466	-3.830	**-2.401****	1.468	0.922	0.262
FB	1.197	17.690	1.761	0.970	-1.276	-0.703	-1.505	-0.829	1.007	0.555	-2.673	-1.471	1.738	0.958	0.215
GOOG	1.042	24.510	1.105	0.968	0.824	0.723	-1.755	-1.538	0.162	0.142	-2.204	**-1.931***	2.037	**1.787***	0.347
NFLX	1.307	12.500	-1.307	-0.466	0.230	0.082	-3.313	-1.181	0.390	0.139	-3.798	-1.353	-0.645	-0.230	0.117
Index_Grp3	1.108	22.024	0.758	0.562	-0.083	-0.062	-2.195	-1.626	0.597	0.443	-2.717	**-2.011****	1.027	0.761	0.299

Signif. codes: '****' 0.001 '***' 0.01 '**' 0.05 '*' 0.1

11 Appendix B - Cluster Robust Estimates

In the main body of the paper (Table 2) we report group results using OLS. Each of the three groups is created using a value weighted index. Table 4 presents the results from using an alternative approach in which we stacked the company data for a group, ran a regression for the group using value weights, and estimated cluster robust standard errors.[54]

The most striking aspect of the results in Table 4 is the number of statistically significant parameter estimates. While Crandall, using OLS, "surprising[]ly]" found that the regulatory developments had little economic or statistical impact on the return of these firms, we find that over a third of the event parameter estimates are economically and statistically significant.[7] These results are supportive of the proposition that when considering the effect of public policy on investment, a proper welfare analysis calls for consideration of the entire ecosystem, not just the ISPs.

The Table 2 coefficients are the same as those reported in Table 4. The clustered standard errors are different than the OLS values–sometimes smaller, and other times larger. The change in the standard errors effects the statistical significance of some of the variables. First, the election of President Trump no longer has a statistically positive significant effect on the ISPs return. This is not a surprising change as the OLS coefficient was only significant for a two-tailed test at a ten percent level of significance.[55] While the Trump election no longer has a statistically significant impact on the ISPs returns, the selection of FCC Chair Pai, as reported on Table 4, has a statistically significant positive impact.

While the regression result for the election of Trump no longer has a statistically significant impact on the ISPs returns, the reduced standard errors increased the statistical negative significance for the New and Old Media companies. For the Old Media firms, there was an additional notable difference between the OLS and panel estimates. The District Courts 2016 ruling, upholding the reclassification of the ISPs, changed from not being statistically significant different from zero, to being significantly positive at the five percent level of significance .

The same can be said about the impact of the panel regression on the New Media companies. While with OLS the Districts Courts 2016 decision to uphold common carrier regulation of the ISPs was not statistically significant, it is highly significant with panel regression. As with the Old Media, the coefficient for the New

[54]The stacked regression has many more observations. For example for the analysis of the ISP industry, rather than having 1,133 observations when running the index regression (Table 2)) the stacked regression has 1,133 X 9 companies = 10,197 observations.

[55]President Trump's election remains statistically significant at the ten percent level if a one-sided test was used (i.e., the alternative hypothesis is that Trump's election would have a positive effect on the ISPs' returns.)

Media companies is positive, indicating that investors looked favorably on the appellate courts decision to uphold common carrier regulation.

There are three other noteworthy changes for the New Media companies relative to the OLS results. The Districts Courts 2014 decision to overturn the Open Network rules had a statistically significant positive effect, as did the selection of Chairman Pai in 2017, on investors returns. On the other hand, the FCCs initiation of the Zero Rating Investigation had a statistically significant negative effect on returns. Investors may have had this reaction because the New Media companies may have been perceived as having a comparative advantage, relative to smaller companies, in using this new conduit to reach mobile telephone subscribers. The investigation raised the risk that the FCC would deny the New Media companies the opportunity to exploit this advantage.

The New Media companies were proponents of Net Neutrality and therefore it is surprising that the investors responded favorably to the 2014 District Courts decision in Verizon v. FCC. It is possible that the investors had a positive reaction because they felt that the Court provided a roadmap for implementing Net Neutrality. [35]

Finally, the investors response to the selection of FCC Chair Pei may reflect a positive attitude they had about the end of the uncertainty regarding who would head the agency.

	VZ v. FCC	Obama Supports Tittle II Regulation	Zero Rating Inves- Litigation	US Telecom Assn v. FCC	Trump	Pai
Group	**1/14/2014**	**11/10/2014**	**12/15/2015**	**6/14/2016**	**11/9/2016**	**1/23/2017**
ISP	-0.201	**-3.059*** **	0.205	0.301	1.606	**0.766***
	-1.023	-2.878	0.59	1.208	1.432	1.836
Old Media	-0.880	0.208	0.767	**0.727****	**-2.080*** **	0.084
	-1.447	0.419	1.3169	2.0811	-3.6497	0.30
New Media	**0.758*** **	-0.083	**-2.195**** **	**0.597*** **	**-2.717**** **	**1.027*** **
	3.089	-0.183	-5.656	3.093	-4.689	2.799

$^{****}p < 0.001$, $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 4: Panel Regression Results with Cluster Robust Standard Errors
(t-statistics shown beneath coefficient estimates)

12 Appendix C - PCA bi-plots

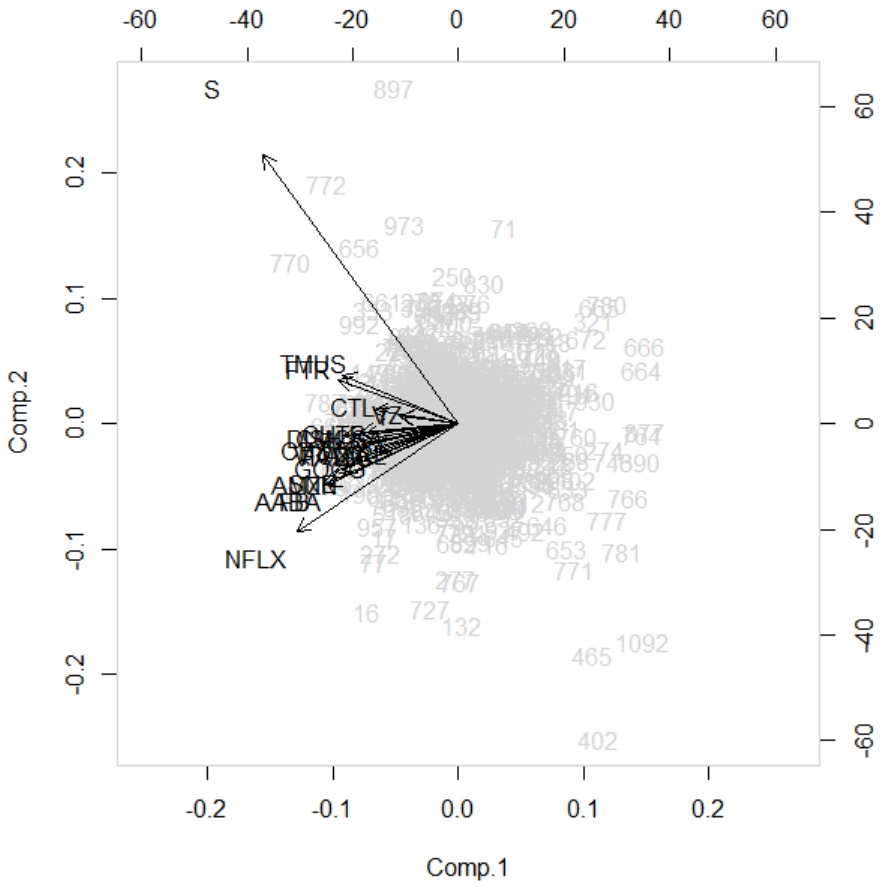

Figure 1: PCA Biplot: All Firms

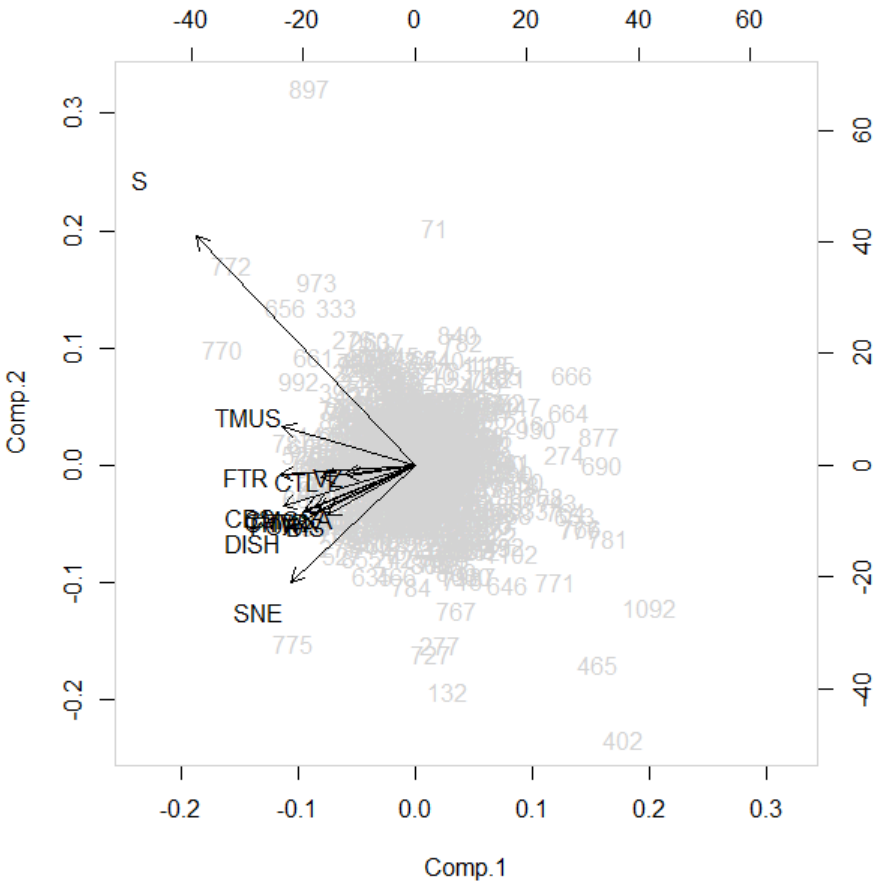

Figure 2: PCA Biplot: ISP's and Traditional Media

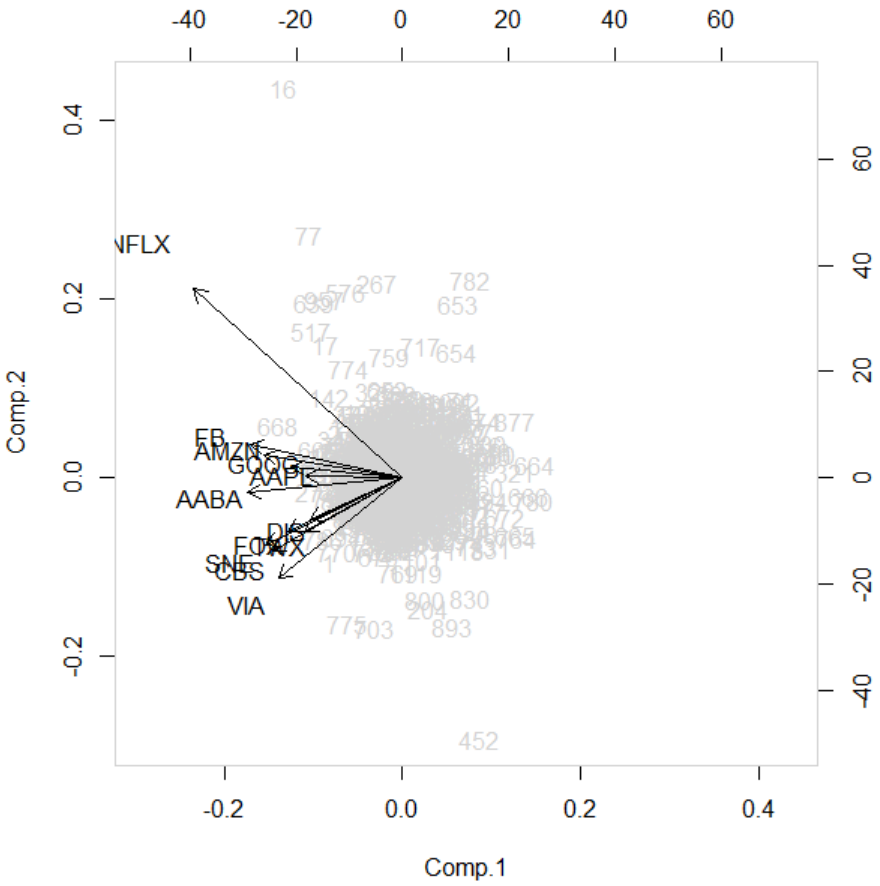

Figure 3: PCA Biplot: Traditional and New Media

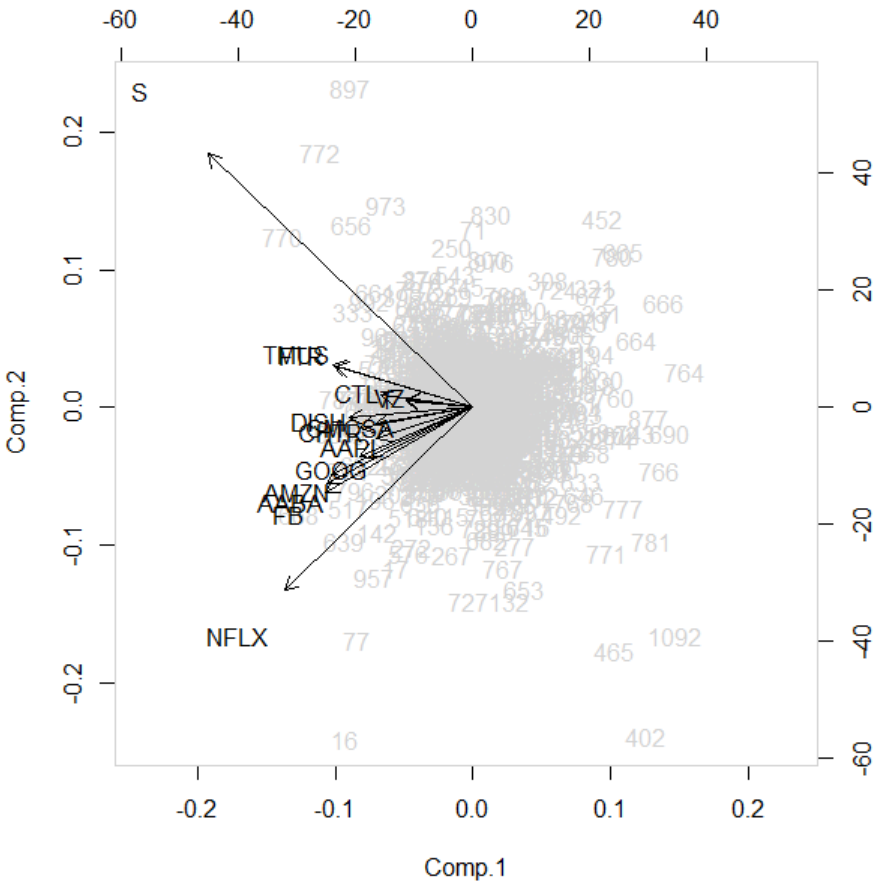

Figure 4: PCA Biplot: ISP's and New Media